TOKAI CARBON CB
Building a Future of Technology and Trust

201 Main Street, Suite 3000
Fort Worth, TX 76102

May 13, 2019

Director, Air Enforcement Division
U.S. Environmental Protection Agency
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1200 Pennsylvania Ave. NW
Washington, D.C. 20460

Director of Litigation
Litigation Division, MC-175
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

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U.S. Environmental Protection Agency, Region 6
1445 Ross Ave.
Dallas, TX 75202-2733

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Environmental Protection Division
Office of the Attorney General of Texas
P.O. Box 12548, MC 066
Austin, TX 78711-2548

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Box 7611 Ben Franklin Station
Washington, D.C. 20044-7611

Re: Tokai Carbon CB
Borger Plant – Alternative Control Technology

Dear Sir/Madame:

Per Provision 19 of Civil Action No. 3:17-cv-01792-SDD-RLB, Tokai Carbon CB hereby submits the enclosed alternative control technology specifications for your review and approval. This alternative technology is the Wet Sulfuric Acid (WSA) Process that will remove SO_2 emissions from the flue gas emitted by the Boilers. The enclosed specifications detail the overall pollution control system, which includes the SCR for the NOx removal. With this submission, please disregard the specifications for the pollution control system that we submitted to you on January 3, 2019.

In addition, we would like to provide you with responses to questions that we received from Mr. Eli Quinn in an email dated February 8, 2019 regarding this control technology.

1. A revised design analysis demonstrating that the alternative pollution control system is capable of meeting the 7 day rolling average limits pursuant to the CD based on design/maximum, normal, and minimum weekly (7 day) tail gas flow rates. The current design proposal addresses the 365 day rolling average pollutant emission limits required by the CD, however, the 7 day rolling average pollutant emission limits are not explicitly addressed in the proposal.

   The alternative pollution control system will be able to meet both the 7-day and 365- day rolling average limits. We have updated the design proposal to address both limits.

   Please see Attachment 1- Process Specification – Borger Pollution Controls_Rev3, Page 01, Section Titled "Justification/Benefits"
   Please see Attachment 1 - Process Specification – Borger Pollution Controls_Rev3, Page 02, Lines 71 to Lines 79.

2. A comparison of historical tail gas flow rates for the past 10 years against the design/maximum, normal, and minimum yearly (365 day) and weekly (7 day) tail gas flow rates used in the design analysis.

   Please see enclosed graph in Attachment 2. The graph shows a comparison between the design flows and the historical trends.

3. A high-level construction schedule that demonstrates that the project will meet dates/deadlines pursuant to the CD.

   Please see Attachment 3 - Borger CD Schedule 11-17-18 "Original Schedule" before patent issues.
   Please see Attachment 3 - Borger CD Schedule 4-3-19 for discussion with EPA during meeting.

4. An updated objective referencing the 365 day and 7 day rolling average limits, and consent decree deadlines.

   Please see Attachment 1 - Process Specification – Borger Pollution Controls_Rev3, Page 01
   Please see Attachment 1- Process Specification – Borger Pollution Controls_Rev3, Page 02, Lines 71 to Lines 79.

5. Revised Process Block Diagram showing separate blocks for the SCR, SO2 Converter, and PM removal system.

   Please see Attachment 1- Process Specification – Borger Pollution Controls_Rev3, Page 03, Process Flow Diagram

6. A revised Process Description that includes descriptions for the SCR, SO2 Converter, WSA Condenser, and PM removal system; include the chemical reactions that take place during each stage.

   Please see Attachment 1– Process Specification - Borger Pollution Controls_Rev3, Page 01, Section Titled "Process Description.
   Please see Attachment 1– Process Specification – Borger Pollution Controls_Rev3, Page 03, Process Flow Diagram

Sincerely,

Long Nguyen
Environmental, Health & Safety Manager

Attachment 1

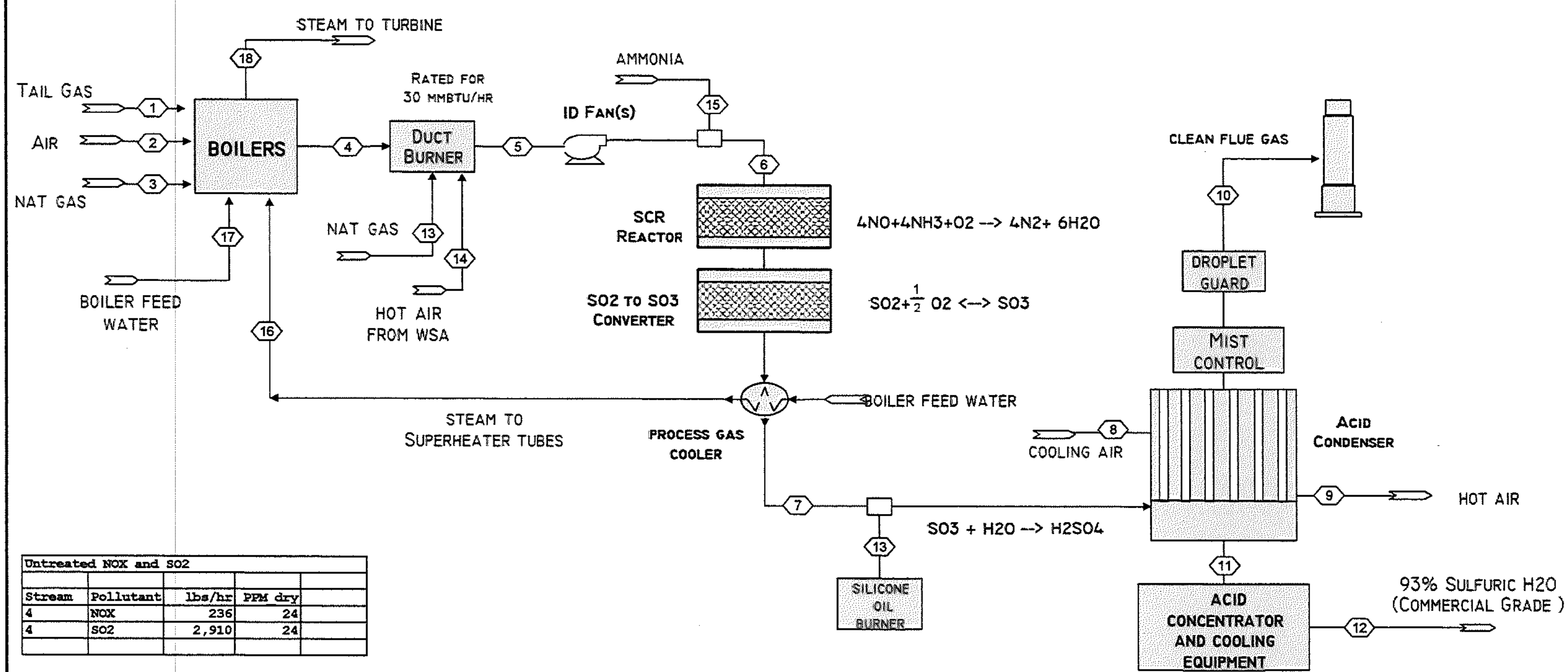
TOKAI CARBON CB Building a Future of Technology and Trust	PROCESS SPECIFICATION
Project Name	Borger Boilers SCR and Wet Sulfuric Acid Process
Plant/Area	Borger Plant – Boilers
Date	04/04/2019
Rev	03

Project Name:	**Borger Boilers SCR and Wet Sulfuric Acid Process**
Objective	To install a selective catalytic reactor (SCR) and a Wet Sulfuric Acid (WSA) process downstream of the existing boilers at the Borger Plant. The equipment shall be designed to meet the emission limits and timelines mandated by the consent decree (CD) with the EPA.
Justification/ Benefits	The Borger plant produces carbon black with feedstock oil containing excess sulfur in a high temperature environment. Natural gas combustion is used as the primary source of heat in the carbon black reactors. The resulting tail gas from the process is partially used in the drying process (30% - 35%). The remaining tail gas (65%-70%) is combusted in two boilers to generate steam for plant consumption and power generation. The consent decree (CD) with the EPA requires that the boilers flue gas be treated for NO_x, SO_2, and PM emissions 1. NOx levels are approximately 300 ppm (dry, at 3% O2) and must be reduced to less than 39 ppm (dry, 0% O2) on a 365-day rolling average and less than 54 ppm (dry, 0% O2) on a 7-day rolling average. 2. SO_2 levels are approximately 2,660 ppm (dry, at 3% O2) and must be reduced to less than 80 ppm (dry, 0% O2) on a 365-day rolling average and less than 120 ppm (dry, 0% O2) on a 7-day rolling average. 3. Particulate Matter discharge from the final stack must be maintained below 0.0069 grains/dscf (EPA Method 5 Filterable PM) on a 3-hour average basis. Refer to attached process flow diagram and data sheet.
Yield/Production	Will increase the cost of production of carbon black
Quality	No impact on quality
Environmental	Reduce the environmental impact of emissions from the Plant.
Process Description	1. Tubes will be removed from the existing boilers (de-rating) to achieve a flue gas exit temperature of 650 °F. 2. A common flue gas header will be retrofitted at the existing boilers stack and tied into the new SCR reactor. 3. Two ID fans will be installed to convey all plant's flue gas. VFDs or inlet dampeners to be installed. 4. A duct burner (~25-30 MMBtu/hr.) will be installed to adjust the flue gas temperature to ~750 deg F before the SCR. 5. 19%- Ammonia, NH3, will be evaporated, diluted with air, injected and properly mixed into the flue gas stream. 6. The flue gas will enter an SCR where ~90% of the NOx will react with NH3 to produce N2 and H2O (Reaction 1.0) 7. Next, the flue gas will enter the WSA catalytic beds where ~99% of the SO_2 will be oxidized to SO_3 (Reaction 2.0) 8. The exothermic reaction of SO_2 to SO_3 will increase the flue gas temperature by close to ~10 deg F. 9. A gas cooler (boiler) will be installed at the discharge of the SO2/SO3 reactor to cool the flue gas down to ~500 °F 10. 500 psig saturated steam will be made at the gas cooler. This steam will be merged with the existing boilers steam, sent through the existing superheater tubes, and used for power generation and plant consumption. 11. The boiler feed water for the process gas cooler will be supplied by the existing boiler feed water pumps 12. The flue gas will enter the WSA condenser where all the SO_3 is condensed into 90% sulfuric acid (Reaction 3.0). 13. A small silicone oil burner (50-100 g/hr) will be installed upstream of the condenser to promote acid condensation. 14. Cooling air (or any other suitable media) will be used to lower the flue gas temperature to the acid dew point. 15. Hot air from the acid condenser will be used at the duct burner, the ammonia system, and the acid concentrator. 16. Any excess hot air will be routed to a safe location for discharge or any other general use. 17. The sulfuric acid will be further concentrated to at least 93% in an acid concentrator tower. 18. A water-cooled heat exchanger will cool the sulfuric acid down to ~100 deg F before sending it to storage tanks 19. 3 storage tanks will be installed to hold in-spec sulfuric acid, off-spec sulfuric acid, and blending acid respectively. 20. A loading terminal will be constructed to load, unload, and weight trucks (unload for blending tank) for sulfuric acid 21. The flue gas exiting the acid condenser will be routed to a stack. Droplet and mist eliminators will be installed prior to the stack.
Safety	Appropriate HAZOP and safety reviewed will be conducted prior to the start of the project. Operating procedures will be developed and operators trained in the safe operation of the equipment
MOC	Will an MOC be required (Refer MOC Procedure)? Yes – To be done during the AFE approval process

Approvals: Plant Manager, Process Eng. Manager, Eng. Director, Manufacturing Director, VP – Production & Eng. via Redmine

TOKAI CARBON CB

Line#								COMMENTS
Line#	**PROCESS DESIGN SPECIFICATION - CORPORATE ENGINEERING**							
1	**BORGER BOILERS - POLLUTION CONTROLS DESIGN SPECIFICATIONS**							
2	**Rev 3**							
3	**Average Tail Gas Composition to Burners**		**Design**	**Minimum**				**COMMENTS**
4	H2O	%	49.21%	47.27%				
5	N2	%	32.41%	33.65%				
6	H2	%	7.96%	8.27%				
7	H2S	%			*NOTE 1*			
8	Arg/O2	%	0.38%	0.39%				
9	CH4	%	0.22%	0.23%				
10	CO	%	7.32%	7.60%				
11	CO2	%	2.10%	2.18%				
12	C2H2	%	0.41%	0.42%				
13	**Total**	%	**100.00%**	**100.00%**				
14	**Tail Gas Flows**							
15	Total Tail Gas Generated	SCFH	9,252,717	1,847,123				
16		Nm3/hr	247,889	49,486				
17	% Tail Gas to Boiler	%	70%	65%				
18	Tail Gas Flow available to boilers	SCFH	6,476,902	1,200,630				
19		Nm3/hr	173,523	32,166				
20	Reheat Natural Gas	SCFH	25,000	4,684				
21		Nm3/hr	670	125	-			
22								
23	**Lines 29 to 70 correspond to Stream No 05 in Process Flow Diagram**					3670870.012	780409.4901	
24			MAX BOILERS CONDITIONS		**DESIGN/MAX CONDITIONS**	**NORMAL CONDITIONS**	**MINIMUM CONDITIONS**	
25								
26								
27	Tail Gas to Boilers- wet (Stream No 1 in PFD)	SCFH	6,476,902		**6,476,902**	**5,647,482**	**1,200,630**	
28	Sulfur in Oil	% Wt	4.0%		**4.0%**	**2.5%**	**2.0%**	
29	Flue Gas Flow From Boilers- Wet (Stream No 4 in PFD)	SCFH	10,243,599		**10,243,599**	**8,931,840**	**1,979,301**	<--- Minimum flow based on Unit 1 in Operation
30		SCFM	170,727		**170,727**	**148,864**	**32,988**	
31		Nm3/hr	274,436		**274,436**	**239,293**	**53,027**	
32								
33	Flue Gas Temp (Boilers Discharge) (Stream No 4 in PFD)	oF	650		**650**	**650**	**650**	<--- Boiler Tubes Reduced to achieve 650 oF at discharge
34		oC	343		**343**	**343**	**343**	<--- Duct Burner will increase temp at SCR Reactor Inlet
35	Flue Gas Pressure (Boilers Discharge) (Stream No 4)	InH2Og	0.0		**0.0**	**0.0**	**0.0**	<--- Typical fluctuation in pressure is 0 to -1 inH2Og
36		barG	0.0		**0.0**	**0.0**	**0.0**	
37								
38	Actual Flue Gas From Stack (Wet) - *NOTE 2*	ACFH	21,866,145		**21,866,145**	**19,066,043**	**4,225,047**	
39		ACFM	364,436		**364,436**	**317,767**	**70,417**	
40		m3/hr	619,180		**619,180**	**539,890**	**119,640**	
41								
42	Flue Gas Composition - % Wet							
43		H2O	36.7%		**36.7%**	**36.2%**	**35.3%**	<--- Typical fluctuation in H2O% are 32% to 40%
44		N2	53.5%		**53.5%**	**53.9%**	**54.7%**	
45		Arg	0.2%		**0.2%**	**0.2%**	**0.2%**	
46		CO2	6.6%		**6.6%**	**6.7%**	**6.8%**	
47		O2	3.0%		**3.0%**	**3.0%**	**3.0%**	<--- Typical fluctuation in O2% are 2% to 4%
48		Total	100.0%		**100.0%**	**100.0%**	**100.0%**	
49								
50	Flue Gas Flow -Dry Basis	SCFH	6,485,766		**6,485,766**	**5,696,993**	**1,280,842**	
51	Flue Gas Flow Composition % -Dry Basis	N2	84.4%		**84.4%**	**84.5%**	**84.5%**	
52		Arg	0.4%		**0.4%**	**0.4%**	**0.4%**	
53		CO2	10.4%		**10.4%**	**10.5%**	**10.5%**	
54		O2	4.8%		**4.8%**	**4.6%**	**4.7%**	
55	**UNTREATED POLLUTANTS BREAKDOWN**							
56			**BOILERS**		**TOTAL**	**TOTAL**	**TOTAL**	
57	**NOTE 1)**		**PPM (Dry)**		**PPM (Dry)**	**PPM (Dry)**	**PPM (Dry)**	
58	NOx (dry at given O2%)	PPM	300		300	300	300	
59	SO2 (dry at given O2%)	PPM	2,660		2,660	1,350	687	
60	SO3 (dry at given O2%)	PPM	15.0		15.00	15.00	14.68	
61	Design Inlet PM Loading	grains/dscf	0.020		0.02	0.02	0.02	<--- EPA Method 05 Filterable PM (For Design ONLY
62	Design Inlet PM Loading	mg/Nm3(dry)	48.4		48.42	48.42	48.42	<--- EPA Method 05 Filterable PM (For Design ONLY)
63	Design Max Inlet PM during bag failure (<0.5 hrs)	grains/dscf	1.24		1.24	1.24	1.24	<--- Under Bag Failure Conditions Only
64	Design Max Inlet PM during bag failure (<0.5 hrs)	mg/Nm3	3,000		3,000	3,000	3,000	<--- Under Bag Failure Conditions Only
61								
62			**BOILERS**		**TOTAL**	**TOTAL**	**TOTAL**	
63			**LB/HR**		**LB/HR**	**LB/HR**	**LB/HR**	
64	NOx	LBS/HR	236		236	207	46	
65	SO2	LBS/HR	2,910		2,910	1,298	148	
66	SO3	LBS/HR	21		20.5	18.0	4.0	
67								
68	**Consent Decree Requirements**							
69								
71	**365-day Rolling Average, NOx outlet, ppm (dry) @ 0% O2 - less than**				**30**	**30**	**30**	
74	**7-day Rolling Average, NOx outlet, ppm (dry) @ 0% O2 - less than**				**54**	**54**	**54**	
75	**365-day Rolling Average, SO2 outlet, ppm (dry) @ 0% O2 - less than**				**80**	**80**	**80**	
77	**7-day Rolling Average, SO2 outlet, ppm (dry) @ 0% O2 - less than**				**120**	**120**	**120**	
78	**PM emissions at final stack , grains/dscf - less than**				**0.0069**	**0.0069**	**0.0069**	<--- on a 3-hr average
79	**PM emissions at final stack , mg/Nm3(dry) - less than**				**16.70**	**16.70**	**16.70**	<--- on a 3-hr average
80	**Ammonia Slip at final stack ppm(dry) @ 3% O2 - less than**				**10.0**	**10.0**	**10.0**	<--- State Requirement
81	**SO3 emissionsat final stack ppm(dry) @ 0% O2 - less than**				**10.0**	**10.0**	**10.0**	
82								
83	**NOTES**							
84	1) H2S in the tail gas converts to SO2 after combustion. This typically varies with the %S in the feedstock oil.							
85	Worst case scenario of 4% S in the feedstock. Normal and min cases are based on 2.5% sulfur							
86	2) Actual conditions corrected for temperature. Actual pressure assumed to be at 1 atm							
87								
88	**APPROVALS:**							
89		**R. Ali**	**L. Nguyen**	**A. J. Bahr**	**P. Pitmann**	**S. Honea**	**R. Bismilla**	



Untreated NOX and SO2			
Stream	Pollutant	lbs/hr	PPM dry
4	NOX	236	24
4	SO2	2,910	24

		English Units		
Stream #	Descrip.	Max Flow	Press	Temp
		MSCFH	inWC	degF
1	Tail Gas	6,477	24	450
2	Air	4,210	24	80
3	Nat Gas	0	—	—
4	Flue Gas	10,244	0	650
5	Flue Gas	10,519	0	750
6	Flue Gas	10,519	30	750

		SI Units		
Stream	Descrip.	Max Flow	Press	Temp
		Nm3/hr	mbar g	deg C
1	Tail Gas	173,523	60	232
2	Air	112,790	60	27
3	Nat Gas	0	—	—
4	Flue Gas	274,436	0	343
5	Flue Gas	281,814	0	399
6	Flue Gas	281,814	75	399

Chemical Reactions

(1.0) $4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$

(2.0) $SO_2 + ½ O_2 \rightarrow SO_3$

(3.0) $SO_3 + H_2O - H_2SO_4$

Pollution Controls Design Efficiency		Stream 10 365-day rolling average	Stream 10 7-day rolling average	Stream 10 3-hr average
NOX	ppm dry @ 0%O2	<39	<54	—
SO2	ppm dry @ 0%O2	<80	<120	—
PM	grns/dscf	—	—	<0.0069

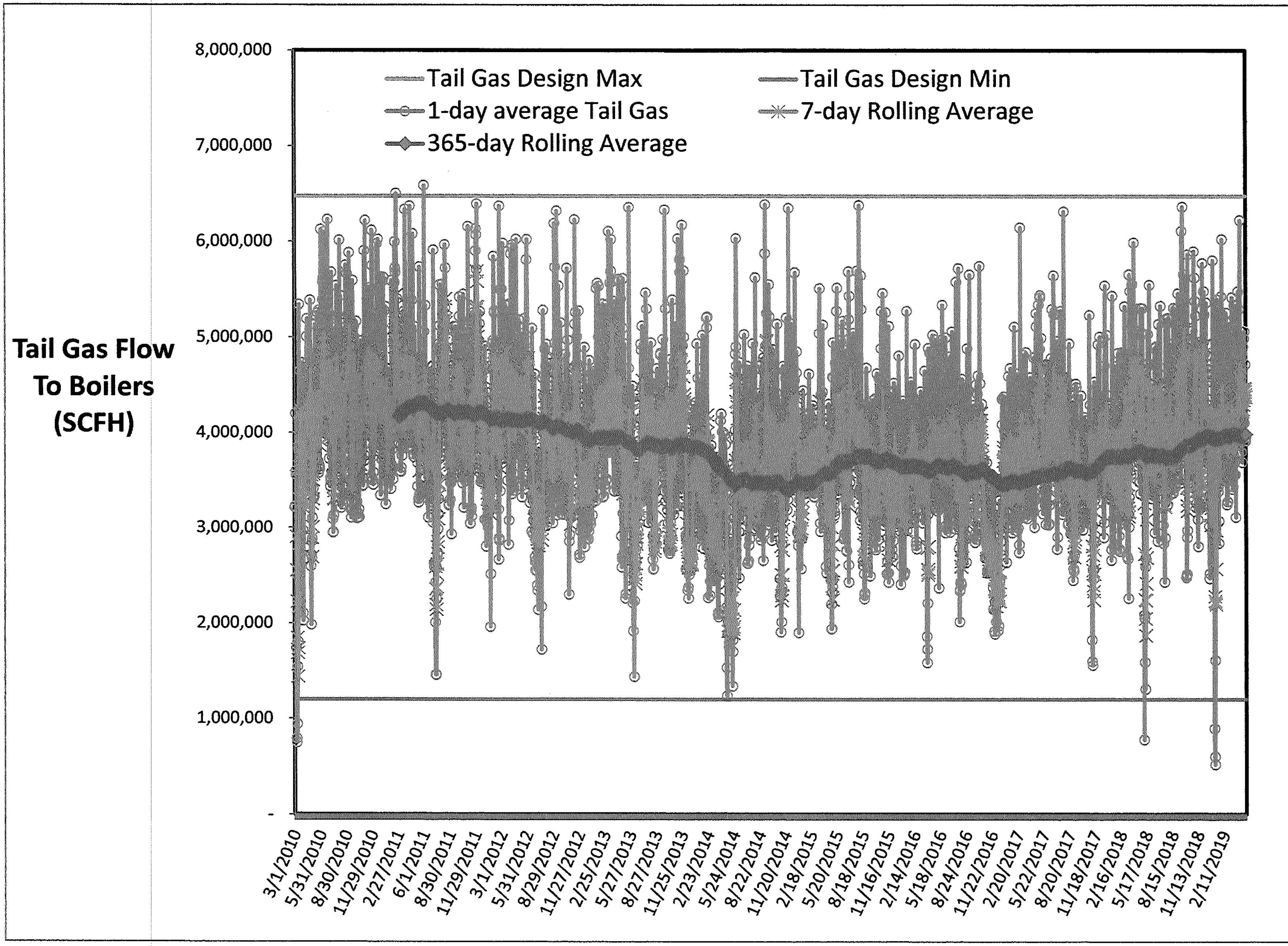
NOTES

1 TBD= To be determined by Vendor or Balance of Plant Engineeering
2 Boilers to be modified for an outlet flue gas temperature of 650 deg F
3 Natural Gas Duct Burner will bring flue gas temperature to 750 deg F
4 Steam from process gas cooler to be controlled at ~500-550 psig
5 Steam from process gas cooler to be routed to existing boilers superheater
6 Existing Feed Water Pumps, Deaerator, and Condenser to handle all steam

Date	Rev	Comment	By
11/1/2018	0	Initial PFD	RA
2/1/2019	1	Final PFD	JG
4/1/2019	2	Final PFD revised	JG
5/10/2019	3	Final PFD revised	JG

Title:	Borger Boilers-Pollution Controls SCR & Wet Sulfuric Acid Process		
Rev:	3		
Date:	5/10/2019		
Plant:	Borger Plant		
Prepared by	Jose Garcia	Date	2/1/2019
Approved by	Roshan Ali	Date	2/1/2019

Attachment 2



Tail Gas Flow
To Boilers
(SCFH)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
Tail Gas Design Max
Tail Gas Design Min
1-day average Tail Gas
7-day Rolling Average
365-day Rolling Average
3/1/2010
5/31/2010
8/30/2010
11/29/2010
2/27/2011
6/1/2011
8/30/2011
11/29/2011
3/1/2012
5/31/2012
8/29/2012
11/27/2012
2/25/2013
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5/24/2014
8/22/2014
11/20/2014
2/18/2015
5/20/2015
8/18/2015
11/16/2015
2/14/2016
5/18/2016
8/24/2016
11/22/2016
2/20/2017
5/22/2017
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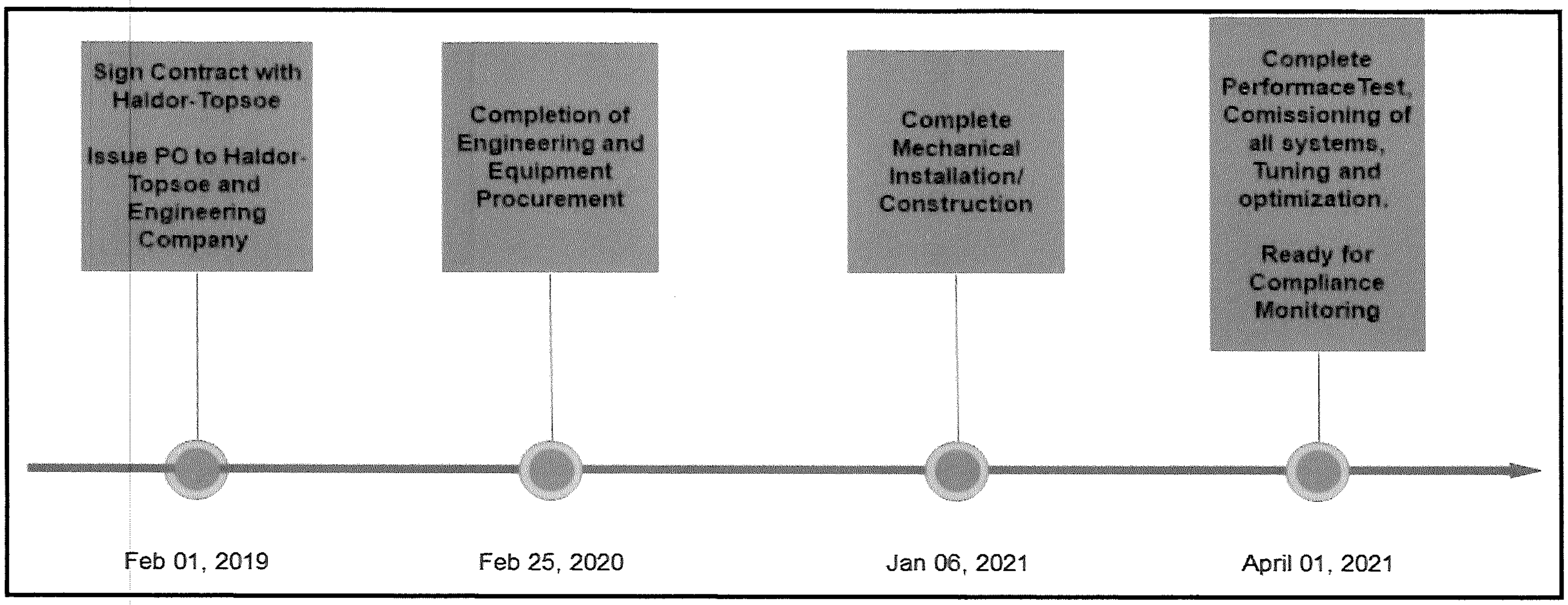
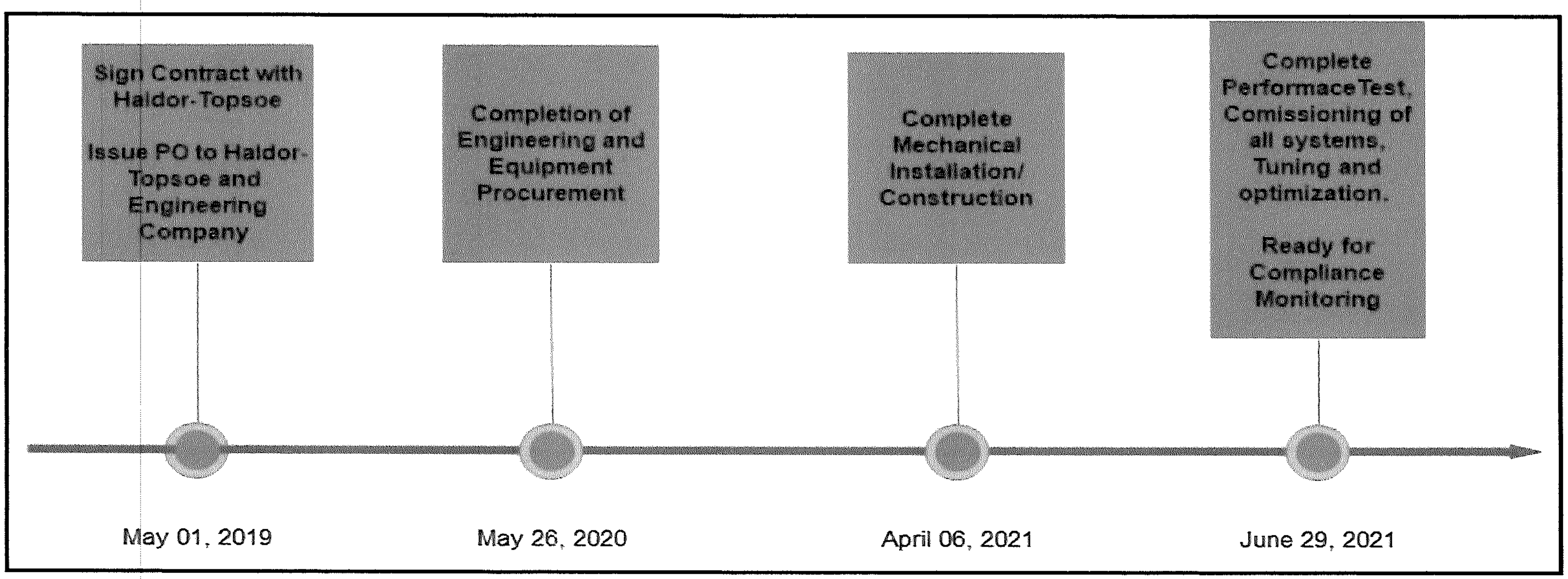
5/17/2018
8/15/2018
11/13/2018
2/11/2019

Attachment 3

Original Schedule

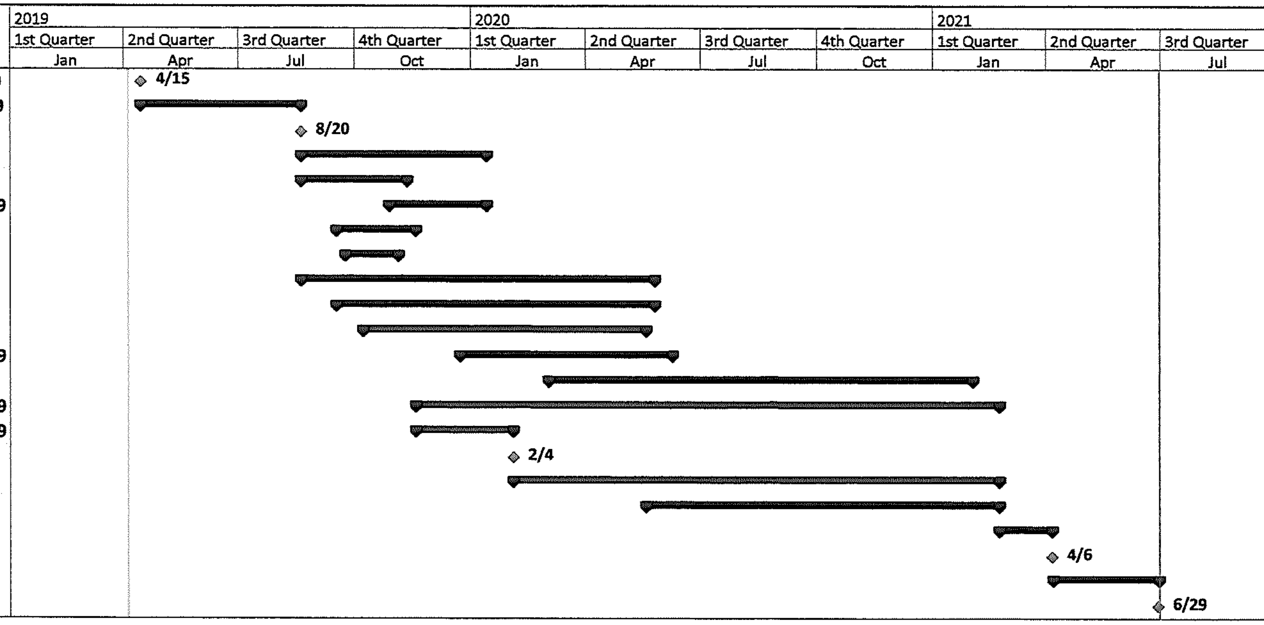


Updated Schedule



BORGER NOx/SOx REDUCTION PROJECT
WET SULFURIC ACID TECHNOLOGY

ID	Task Mode	Task Name	Duration	Start
1		**AFE**	0 days	Mon 4/15/19
2		**Process Design**	**91 days**	**Mon 4/15/19**
14		**DETAIL ENGINEERING DESIGN**	0 days	Tue 8/20/19
15		**Mechanical**	**105 days**	**Tue 8/20/19**
16		**Finalize Equipment Layouts**	**60 days**	**Tue 8/20/19**
26		**Interconnecting Piping & Duct Work**	**55 days**	**Tue 10/29/19**
29		**Civil Structural**	**45 days**	**Tue 9/17/19**
32		**Electrical**	**30 days**	**Tue 9/24/19**
39		**Controls**	**200 days**	**Tue 8/20/19**
45		**EQUIPMENT PROCUREMENT**	**180 days**	**Tue 9/17/19**
58		**ELECTRICL PROCUREMENT**	**160 days**	**Tue 10/8/19**
61		**INSTRUMENT PROCUREMENT**	**120 days**	**Tue 12/24/19**
64		**Programming / HMI**	**240 days**	**Tue 3/3/20**
69		**INSTALLATION**	**330 days**	**Tue 11/19/19**
70		**Civil Concrete**	**55 days**	**Tue 11/19/19**
76		**Equipment Installation**	0 days	Tue 2/4/20
77		**Mechanical & Piping**	**275 days**	**Tue 2/4/20**
133		**Electrical**	**200 days**	**Tue 5/19/20**
142		**COMMISIONING**	**30 days**	**Tue 2/23/21**
147		**SYSTEM START-UP**	0 days	Tue 4/6/21
148		**SYSTEM OPTIMIZATION**	**60 days**	**Wed 4/7/21**
151		**EPA MONITORING READY**	0 days	Tue 6/29/21



Project: Topsoe Schedule
Date: Fri 4/5/19

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	